RESPONSES TO U.S. EPA & OEPA COMMENTS ON THE 1998 INTEGRATED SITE ENVIRONMENTAL REPORT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

SEPTEMBER 1999

U.S. DEPARTMENT OF ENERGY

1

RESPONSES TO U.S. EPA COMMENTS ON THE 1998 INTEGRATED SITE ENVIRONMENTAL REPORT

SPECIFIC COMMENTS

1. Commenting Organization: US EPA Commentor: Saric
Section #: Table 2-4 Pg.#: 40 Line #: NA Code:
Original Specific Comment #: 1

Comment: The entry for flood plain and wetland review requirements notes that delineation was performed in 1992 and approved in 1993 and that updates are performed "approximately every five years." However, the table does not note an update in 1998 or a previous year. If an update is planned for 1999, perhaps after completion of the wetland mitigation construction in the northeast corner of the facility, the update should be noted in the table. If no update is planned, the "every five years" text should be revised in future annual reports to reflect the actual situation.

Response: The original delineation is not updated every five years. When it is suspected that wetland areas not included in the approved delineation are developing or have developed, the suspect areas are assessed for wetland characteristics using the three parameter approach in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual. These additional jurisdictional wetland areas are identified in agency notification letters, Integrated Environmental Monitoring Plan (IEMP) quarterly status reports, and annual integrated site environmental reports.

Action: Table 2-4 will be revised to reflect current wetland assessment practices in the 1999 Integrated Site Environmental Report.

2. Commenting Organization: US EPA Commentor: Saric
Section #: Figure 3-1 Pg.#: 45 Line #: NA Code:
Original Specific Comment #: 2

Comment: Figure 3-1 shows the entire South Field Module as a "future module area," but Figure 3-2 on Page 47 shows this area as a "current module area," and the text on Page 46 discusses data for the area. Figure 3-1 should be made consistent with the text and other figures in future annual reports.

Response: The U.S. Department of Energy (DOE) agrees with the comment. The South Field area contains a currently operating module (Phase I) and will contain additional wells in the future comprising Phase II of this module.

Action: In future IEMP annual integrated site environmental reports, figures depicting the status of modules (current, future, or combination) will undergo additional QA checks to ensure that the appropriate designation is depicted on the figures.

3. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.4.2 Pg.#: 100 Line #: NA Code:
Original Specific Comment #: 3

Comment: The text states that during the fourth quarter of 1998, there were 24 "exceedances of the DOE Order 5400.5 100 pCi/L radon limit" at the K-65 silos exclusion fenceline. This number differs from the 20 exceedances listed in Table 3-7 of the integrated environmental monitoring status (IEMS) report for the fourth quarter of 1998. This inconsistency should be resolved.

Response: DOE notes that the text referenced by the commentor in the 1998 Integrated Site Environmental Report states, "There were 24 exceedances of the 100 pCi/L DOE limit measured on site during 1998 compared with five in 1997." This represents the total number of exceedances that occurred during 1998. The 20 exceedances reported in

Table 3-7 of the Integrated Environmental Monitoring Status Report for Fourth Quarter 1998 represents the number of exceedances that occurred during the fourth quarter of 1998. Therefore, there is no inconsistency.

Action: No action required.

4. Commenting Organization: U.S. EPA Commentor: Saric

Section #: 6.1 Pg.#: 107 Line #: NA Code:

Original Specific Comment #: 4

Comment: The text states that the maximum effective dose at the fenceline from 1998 air emissions occurred at location AMC-9C and was estimated at 0.26 millirem (mrem) per year. This information differs from data presented in Table 3-4 of the IEMS report the fourth quarter of 1998, which indicates a maximum effective dose of 0.25 mrem per year at location AMS. This inconsistency should be resolved.

Response: The inconsistency noted is the result of different averaging methods used in the quarterly and annual reports. In the Integrated Environmental Monitoring Status Report for Fourth Quarter 1998, the year-to-date National Emissions Standards for Hazardous Air Pollutants (NESHAP) tracking results (reported in Table 3-4) were tabulated based on average quarterly measurements of radionuclide concentrations. For simplicity in the tracking of dose from airborne emissions, each sampling quarter is given equal weight, although it is recognized that the sampling quarters are not of precisely equal length. For the 1998 Integrated Site Environmental Report, the NESHAP compliance results were based on annual average radionuclide concentrations which accounts for the differences in the lengths of the four sampling quarters. This difference in averaging methods generated the small differences in the maximum dose and location of the maximum dose as reported in IEMP quarterly status reports and annual integrated site environmental reports.

Actions: No action required.

RESPONSES TO OEPA COMMENTS ON THE 1998 INTEGRATED SITE ENVIRONMENTAL REPORT

Comments

5. Commenting Organization: Ohio EPA Commentor: DSW
Section #: General Pg.#: na Line #: na Code: E
Original Comment #: 1
Comment: It is obvious an effort was made to clear up the difficulty in reading the sidebars. The transition from color to black and white, still leaves these sidebars difficult to read. Whereas with the color copies I can still read the sidebars, but with the black and white versions, I skip them because they are too difficult to read.
Response: The sidebars were lightened this year to make them more readable.
Action: DOE will continue to attempt to improve the quality of the black and white version of IEMP annual integrated site environmental reports.

6. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: General Pg.#: NA Line #: NA Code: E
Original Comment #: 2
Comment: The text states that one of the drivers of the ISER is to track and trend air monitoring data. The graphical representation of the data is buried within the appendices. A method for displaying the graphically within the body of the text should be considered.
Response: The 1998 Integrated Site Environmental Report is written to summarize 1998 environmental monitoring activities and results for a broad audience of Fernald stakeholders which consist of both the agencies and the public. Summary-level graphical representation of the data along with tabular display of the data are provided in the up-front document for both the public and the agencies that meet the commitment of tracking and trending air monitoring data. However, detailed graphical presentations are provided in the appendices to allow the agencies to focus on the data and to further meet the commitment of tracking and trending air monitoring data.
Action: No action required.

7. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: NA Pg.#: NA Line #: NA Code: G
Original Comment #: 3
Comment: The Mann-Kendall test for trend is frequently used in Appendices A.1 through A.6. US EPA guidance (US EPA, 1998) recommends use of the normal approximation form of the test for large sample sizes (more than 10). The exact test should be used for smaller sample sizes. The footnotes at the bottom of the Mann-Kendall test results tables should note that the normal approximation form of the test was used where appropriate.
Response: The Mann-Kendall test for trend that is used in the generation of the report uses the normal approximation form of the test for large sample sizes (10 or more) and the exact test for smaller sample sizes. This is identified in the approach for the manual Mann-Kendall test for trend and in the U.S. Environmental Protection Agency (EPA) guidance manual. Therefore, it will not be necessary to add additional text to the Mann-Kendall footnotes.
Action: No action required.

8. Commenting Organization: Ohio EPA Commentor: DSW
Section #: 1.3.2 Pg.#: 9 Line #: Figure 1-3 Code: E
Original Comment #: 4

Comment: The addition of the blue line to highlight Paddys Run is a welcome addition, however in the vicinity of the southern waste units, the blue line does not follow Paddys Run. In particular, the area that was stabilized with the bioengineering is north of the blue line indicating Paddys Run. As this section of Paddys Run is especially significant since it has the bioengineered stream banks, it seems relevant to accurately highlight Paddys Run in this area.

Response: DOE acknowledges the comment.

Action: This figure will be corrected in the 1999 Integrated Site Environmental Report.

9. Commenting Organization: Ohio EPA Commentor: DSW
Section #: 2.1.5 Pg.#: 29-30 Line #: Code: E
Original Comment #: 5

Comment: The last two bullets on page 29 are repeated on page 30.

Response: DOE acknowledges the comment.

Action: These last two bullets have been removed in the color version of the 1998 Integrated Site Environmental Report.

10. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.3.3 Pg.#: Table 3-3 Line #: Code: c
Original Comment #: 6

Comment: The total uranium concentration reported for monitoring location 12339D along with the volumes presented in Figure A.6-3 are indicative of a catastrophic failure of the OSDF Cell 2 liner system. Regardless of the explanations provided in Section A.6.2, deferring the reporting of failures of this magnitude for six months (from December of 1998 until the delivered date of this Report, June 1, 1999) is unacceptable.

Discussions are currently underway with representatives of the Aquifer Restoration and Wastewater project to determine which of the currently measured data are sufficient to meet the needs of the Ohio EPA. We anticipate that the reporting will be accomplished by the weekly fax.

Response: As noted in discussions with the Ohio Environmental Protection Agency (OEPA) since submittal of the 1998 Integrated Site Environmental Report, rather than a catastrophic failure of the on-site disposal facility Cell 2 liner system, the large volumes pumped from the Cell 2 leak detection system (LDS) manhole and the 71 micrograms per liter $\mu g/L$ uranium concentration in the Cell 2 LDS are attributed to a malfunctioning check valve. This malfunctioning valve allowed leachate from the leachate line to back-up into the Cell 2 LDS. The malfunctioning check valve was replaced in May 1999 with a normally closed gate valve (i.e. only opened when the operator is pumping water from the LDS inner containment vessel to the LTS). DOE agrees that this information should have been provided in a more timely manner and, as noted by the commentor, discussions have taken place regarding how DOE can be more proactive in providing key on-site disposal facility LDS monitoring data to OEPA. The following summarizes DOE's understanding of the additional reporting of the key LDS data that was agreed on with the commentor and has been implemented:

- Reporting via the weekly agency update FAX will include:

  1) The date that the LDS primary containment vessel was pumped and the cell-specific LDS accumulation rate in gallons per day since the previous pumping (if LDS vessel was pumped in week prior)
  2) Cell-specific LDS uranium concentrations and date sampled (if LDS vessel was pumped in week prior)
  3) Results of weekly containment pipe monitoring (i.e., okay or explain any anomalies)(four locations per cell).

- IEMP quarterly status reports will include:

  1) For each cell, a summary graph depicting the LDS accumulation rates derived from each inner containment vessel fill/pump down cycle
  2) Summary statistics on these accumulation rates (e.g., quarterly minimum, maximum, and average).

The weekly information will provide OEPA with the opportunity to trend the LDS data to provide for more timely discussion of any concerns raised by this key data. The weekly site conference call will also be used to provide the EPA and OEPA early notification of unacceptable trends in the other LDS monitoring data being collected and evaluated. The quarterly information will allow the evaluation of longer term trends of the accumulation rates.

Note that since the high readings in December 1998, the Cell 2 LDS accumulation rates have decreased to far less than the regulatory based on-site disposal facility action leakage rate of 200 gallons per acre per day (gpad). The action leakage rate was established in Section 9 of the On-Site Disposal Facility Design Calculation Package. In fact, the highest accumulation rate (refer to Figure 1-37 of the Integrated Environmental Monitoring Status Report for First Quarter 1999) observed since hourly datalogger measurements began in early May (6.8 gpad) is only one third of the 20 gpad initial response leakage rate for individual cells (refer to Section 9 of the On-Site Disposal Facility Design Calculation Package). As of September 11, 1999, the accumulation rate for the Cell 2 LDS is down to 0.9 gpad, which is more than a full order of magnitude below the initial response leakage rate (Cell 1 is down to 0.48 gpad). Also, as discussed with EPA and OEPA during the July 27 1999 meeting, the Cell 2 LDS accumulation rates compare favorably to rates observed in a 1995 EPA sponsored study of 26 other landfills which, similar to the on-site disposal facility, utilized geosynthetic clay liners in their design. The uranium concentration in water from the Cell 2 LDS as of late August was down to around 10 μg/L from the December 1998 observed high of 71 μg/L. The above information confirms that the on-site disposal facility liner system is not experiencing a failure.

It is noted that the information provided to EPA on July 27 contained an error in the conversion of liters per hectare per day to gallons per acre per day. This error resulted in an overly conservative portrayal of the Cell 1 LDS accumulation rate in comparison to other "Active" landfills with geosynthetic clay liners. However, upon further review of construction details of the Fernald Environmental Management Project (FEMP) on-site disposal facility,

DOE now considers the current "stage" of Cell 1 to be somewhere between the "initial" and "active" stages. The basis for this determination is due to the presence of the catchment area which allows the majority of rainfall to reach the leachate collection layer sooner and at higher rates than if it had to percolate through the waste as in commercial landfills.

Even though DOE considers the stage of Cell 1 to be a hybrid between "Initial" and "Active," note that the Cell 1 LDS accumulation rates are generally below the mean peak flow rate (0.82 gpad) of the landfills designated to be in their "Active" stage in the EPA sponsored study. DOE agrees that because the Cell 1 LDS accumulation rate is near the top of the expected band that this parameter requires increased attention.

DOE has initiated the filling of the Cell 1 catchment area and is reviewing the capping schedule. When the catchment area has been filled, Cell 1 can be considered to be in the "Active" stage. In the interim, DOE will continue to closely monitor, evaluate, and report on this sensitive parameter.

Action: DOE will provide the additional weekly and quarterly reporting information as noted in the response.

11. Commenting Organization: Ohio EPA Commentor: DSW
Section #: 4.1 Pg.#: 65 Line #: bottom of page Code: E
Original Comment #: 7

Comment: It appears as though the last sentence on this page was cut off. There is only one pathway given.

Response: DOE agrees with the comment.

Action: The last sentence that was omitted from the black and white version on the first page of Chapter 4 has been reinserted for the color version of the 1998 Integrated Site Environmental Report.

12. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 5.3.1 Pg.#: 91 Line #: NA Code: C
Original Comment #: 8

Comment: The results obtained from STP-1 should be included in the dose assessment for the site. Air monitoring was implemented at this location to fill a hole in the IEMP monitoring network associated with the STP area remediation. Dose assessments are intended to be conservative and hence, should include STP-1 as a fence line monitor.
(Note: STP-1 was not placed in the prevalent wind direction.)

Response: The STP-1 monitor was established to assess fugitive emissions resulting from activities associated with the Sewage Treatment Plant Complex. Therefore, the monitoring location was established on the STP project boundary, and not the site fenceline. The sampling and analysis program for the STP monitor (biweekly total uranium and total particulate) was also established with thought of providing only an assessment of fugitive emissions. The quarterly composite analysis which provides data on radionuclide composition of the emissions and contributions to dose was not collected for the STP-1 monitor. Additionally, STP-1 was operated only during the second half of the year and would therefore not provide a complete data set to support an annual dose calculation. For these reasons (location and limited data set), the results from STP-1 are not strictly analogous to the IEMP fenceline network, and DOE does not agree that the results obtained from STP-1 should be included in the annual dose assessment for the site.

Although DOE does not support including data from STP-1 in the annual dose calculation, for your information an estimated dose associated with the particulate uranium collected from this monitor for the operating period was calculated at approximately 0.19 millirem (mrem). For comparison, an estimated dose from particulate uranium collected at AMS-3, which is on the site fenceline and north of the STP Complex, was calculated at approximately 0.18 mrem for the same operating period.

Action: No action required.

13. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 6.5 Pg.#: 112 Line #: NA Code: C
Original Comment #: 9

Comment: In order to verify/justify the use of the 0.7 equilibrium ratios for the radon dose assessment, FEMP should consider measuring this ratio at select fence line radon monitoring locations.

Response: Radon dose estimates are provided in response to stakeholder concerns utilizing published (NCRP 78) equilibrium ratios that are conservative and applicable to environmental exposures to radon and its daughters. While measurements of the equilibrium ratio have not been made at the FEMP fenceline, measurements have been made near the K-65 Silos and indicate that typical values are between 0.3 and 0.5. Considering this measurement data and the proximity of the silos to the western fenceline, the use of the 0.7 equilibrium ratio (which leads to a higher estimated dose than an equilibrium ratio of less than 0.7) is an acceptable, conservative, and simplifying assumption in radon dose estimates. In addition, the use of the 0.7 equilibrium ratio facilitates the comparison of radon dose estimates from the FEMP and the Fernald Dosimetry Reconstruction Project. DOE recognizes that if the radon regulations change from concentration-based limits to dose-based limits, measuring the equilibrium ratio at fenceline radon monitoring locations may be necessary.

Action: No action required.

14. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.1 Pg.#: A.1-4 Line #: 32 Code: C
Original Comment #: 10

Comment: The text indicates that with the continued monitoring of Monitoring Wells 2128 and 2900, the loss of access to Monitoring Well 2458 should not adversely affect the monitoring network. It should also be noted that Monitoring Well 2636 is in closer proximity to 2458 and also was "down significant." The continued monitoring of this well will also be important given the loss of 2458.

Response: DOE agrees that continued monitoring of Monitoring Well 2636 is important given that access has been denied to Monitoring Well 2548. Therefore, Monitoring Well 2636 will continue to be monitored under the IEMP.

Action: No action required.

15. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: Figure A.2-3 Line #: NA Code: E
Original Comment #: 11

Comment: The location of the Inactive Flyash Pile should be shown on the Figure for reference.

Response: Adding the location of the Inactive Flyash Pile to Figure A.2-3 would interfere with the total uranium plume contours and make the map too cluttered.

Action: No action required.

16. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: Figure A.2-5 Line #: NA Code: E
Original Comment #: 12

Comment: The contours in the south field vicinity are confusing. Both third and fourth quarter contoured plumes appear to be presented. There is, however, no explanation on the figure or in the text.

Response: The confusion with the map resulted from two sets of contours being posted to the map by mistake.

Action: DOE will make every attempt to ensure the quality and correctness of maps presented in future IEMP reports.

17. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: A.2-1 Line #: 33 Code: C
Original Comment #: 13

Comment: The statement that total uranium concentrations have not changed significantly in the area south of the inactive flyash pile is contradicted by one of the two sets of contours shown on Figure A.2-5. Further, at least at one monitoring point (Extraction Well 31566), concentrations spiked upward significantly during the fourth quarter (from just less than 10 to nearly 50 μg/L).

Response: As stated in the DOE Comment Response #16, the confusion resulted from two sets of contours being posted to the map by mistake. The contours that conflict with the statement concerning change in the Inactive Flyash Pile area should not have been posted on the map.

The high total uranium concentrations measured in the fourth quarter of 1998 in Extraction Well 31566 are not considered to be representative of aquifer conditions. Evaluation of sampling methodology during the fourth quarter of 1998 indicates that the well was not consistently purged of three well volumes prior to sampling. This was further discussed on page 1-2 of the Integrated Environmental Monitoring Status Report for First Quarter 1999 and in Responses to U.S. EPA and OEPA Comments on the Integrated Environmental Monitoring Status Report for First Quarter 1999, Comment Response #7.

Action: No action required.

18. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: Figures A.2-6 and 7 Line #: NA Code: E
Original Comment #: 14

Comment: These figures should state the quarter when the geoprobe data used to construct the cross sections presented on them was collected.

Response: DOE agrees that providing the date that the data were collected on future cross-sections would be useful. Direct push data, presented in Figures A.2-6 and A.2-7, were collected during the second and third quarters of 1998 (May 12, 1998 to July 7, 1998). Direct push data, presented in Figure A.2-8, were collected during the third quarter of 1998 (July 1998).

Action: DOE will identify when direct push data were collected on future cross-sections.

19. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: A.2-4 Line #: 3 Code: C
Original Comment #: 15

Comment: Please indicate the portion of the period of record for Monitoring Well 2648 that was affected by surface water inflow.

Response: Records indicate that surface water inflow might have been affecting Monitoring Well 2648 as early as December 7, 1998. The situation was corrected on February 2, 1999. Water monitoring personnel first reported that the integrity of Monitoring Well 2648 had been compromised on January 27, 1999. The construction which was responsible for compromising the well began on December 7, 1998. Actual surface water inflow into the well most likely began after December 7, 1998, but DOE has no records which can confirm a more exact date.

Action: An additional explanation is being provided in the Integrated Environmental Monitoring Status Report for Second Quarter 1999.

20. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.2 Pg.#: A.2-4 Line #: 22 Code: E
Original Comment #: 16

Comment: Figure references A.1-12 and A.1-15 should be A.1-6 and A.1-9, respectively.

Response: DOE acknowledges the comment.

Action: DOE will make every attempt to ensure the correctness of figure numbers in future IEMP reports.

21. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.3 Pg.#: A.3-2 Line #: 31 Code: C
Original Comment #: 17

Comment: The text should also note that an additional well showing significant change from third to fourth quarter was 22303. It showed southwestward flow with very low variability in second and third quarters but was transitional from southeast to northeast to south-southwest during the fourth quarter period of observation (see Figure A.3-85). It should also be noted that there is very low variability around the observed trend. Is there any connection among the fourth quarter observations at 22303 and changes in south plume optimization well 32308 and 32309 pumping rates at about the same time?

Response: DOE agrees that Monitoring Well 22303 also showed a significant flow direction change between the third and fourth quarters of 1998, as measured by the borescope. Monitoring Well 22303 is located approximately 25 feet from Re-Injection Well 22111. Re-injection began on September 2, 1998 at a rate of 200 gpm. The subject flow direction change is attributed to the water level rise around Re-Injection Well 22111 which resulted from the re-injection.

Action: No action required.

22. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.3 Pg.#: A.3-2 Line #: 31 Code: C
Original Comment #: 18

Comment: The text makes the general assertion that the observed flow direction changes may reflect "recharge conditions" within the aquifer. This term needs clarification. Are the recharge conditions believed to be the result of precipitation and are, therefore, transient? What is the likelihood that the observed flow direction changes are a permanent byproduct of reinjection?

Response: The comment raises two issues. First, are the flow direction changes a permanent byproduct of re-injection and second, what is meant by "recharge conditions"?

DOE does not believe that the subject flow direction changes measured with the borescope are a permanent byproduct of re-injection. Some of the subject flow direction changes are occurring at a distance of over 1800 feet from the closest re-injection well. Water level data collected from the Re-Injection Demonstration

indicate that water table mounding from the re-injection wells is limited to the area near the re-injection wells. The aquifer readily accepts the re-injected water and the resulting water table mound dissipates a short distance from the re-injection well.

The "recharge condition" referred to in the report appears to be seasonal in nature. In 1998 seasonal high water levels occurred during the second and third quarters, and seasonal low water levels occurred during the first and fourth quarters. The seasonal drop in water levels between the third and fourth quarters (due to a decline in recharge) is believed to be the cause of the shift in borescope flow direction measurements presented in the report.

Action: DOE will continue to evaluate flow directions in this area.

23. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.5 Pg.#: A.5-1 Line #: 9 Code: E
Original Comment # 19

Comment: The text is misleading in that it implies that all results (i.e., every analyses ever run in the past) were below the FRL when some results since 1993 were above.

Response: DOE acknowledges that the text could have been made clearer by inserting "1998" between "all" and "results".

Action: No action required.

24. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Appendix A.6 Pg.#: A.6-2 Line #: 24 Code: E
Original Comment #: 20

Comment: The FEMP perched water constituent concentrations defined in the OU 5 RI that are referenced should be provided.

Reference:
U.S. EPA 1998. Guidance for Data Quality Assessment, Practical Methods for Data Analysis. EPA QA/G-9, QA97 update.

Response: At the time the Remedial Investigation Report for Operable Unit 5 was issued, it received a wide distribution among the EPA, OEPA, and their contractors. Therefore DOE assumed that the commentors had access to the report. The referenced perched water concentrations can be found in Table 4-45 of the Remedial Investigation Report for Operable Unit 5. A copy of the table is attached for your convenience.

Action: DOE has provided the requested information as Attachment 1 to these comment responses.

25. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Appendix E Pg #: E-2 Line #: na Code: C
Original Comment #: 21

Comment: To assist the reader with a frame of reference for these results, it may be useful to include a column with the FRLs.

Response: DOE agrees with the comment.

Action: The appropriate final remediation levels will be included in future IEMP annual integrated site environmental reports.

TABLE 4-45

SUMMARY STATISTICS FOR MAJOR CONTAMINANTS IN FEMP TYPE 1 WELLS[a]

Parameter	Filter Flag	Units	Frequency of Detection[b]	Frequency of Detection > Background	Median[c]	Range of Detection Results	Range of Non-Detect Results	95th Percentile of Background
Uranium-238	FIL	pCi/L	126/148	--	9.2	.400 - 44100	.200 - 1.00	NA
Uranium-238	UNF	pCi/L	191/211	185/211	11.3	.300 - 39000	.200 - 1.00	0.800
Uranium, total	FIL	µg/L	174/181	169/181	40.3	.290 - 129000	.100 - 1.00	1.40
Uranium, total	UNF	µg/L	273/275	268/275	45.7	.400 - 436000	.100 - .100	1.30
Uranium-234	FIL	pCi/L	129/147	124/147	8.47	.300 - 42800	.200 - .700	0.600
Uranium-234	UNF	pCi/L	186/206	175/206	8.72	.00100 - 25000	.200- 1.00	0.900
Thorium-230	FIL	pCi/L	45/148	45/148	--	.251 - 24.3	.200 - 1.00	ND
Thorium-230	UNF	pCi/L	104/192	38/192	--	.227 - 28.0	.200 - 4.70	1.30
Radium-226	FIL	pCi/L	21/152	21/152	--	1.07 - 16.6	.0900 - 1.20	0.900
Radium-226	UNF	pCi/L	86/195	86/195	--	1.01 - 35.8	.14400 - 25.0	0.900
Lead-210	FIL	pCi/L	0/1	0/1	--		3.00 - 3.00	NA
Lead-210	UNF	pCi/L	0/3	0/3	--		3.00 - 3.00	NA
Polonium-210	UNF	pCi/L	0/2	0/2	--		1.20 - 1.70	NA
Uranium-235/236	FIL	pCi/L	78/148	78/148	0.50	.236 - 2170	.100 - 1.20	ND
Uranium-235/236	UNF	pCi/L	100/189	100/189	0.50	.208 - 2490	.100 - 208	ND
Thorium-232	FIL	pCi/L	14/147	14/147	--	.216 - 10.0	.100 - 8.5	ND
Thorium-232	UNF	pCi/L	61/192	53/192	--	.300 - 11.5	.100 - 4.70	0.340
Thorium, total	FIL	µg/L	40/71	40/71	1.575	.912 - 10.6	.500 - 9.48	ND
Thorium, total	UNF	µg/L	119/173	64/173	2.575	.700 - 23000	.500 - 43.0	3.10
Radium-228	FIL	pCi/L	26/153	26/153	--	3.10 - 16.0	.0330 - 5.00	2.20
Radium-228	UNF	pCi/L	32/190	32/190	--	3.10 - 219	1.49 - 44.0	3.00
Thorium-228	FIL	pCi/L	22/146	22/146	--	.300 - 10.0	-.0140 - 1.03	0.100

TABLE 4-45 (Continued)

Parameter	Filter Flag	Units	Frequency of Detection[b]	Frequency of Detection > Background	Median[c]	Range of Detection Results	Range of Non-Detect Results	95th Percentile of Background
Thorium-228	UNF	pCi/L	92/192	19/192	--	.293 - 14.0	.200 - 13.8	1.50
Neptunium-237	FIL	pCi/L	7/36	7/36	--	0 - 1.97	.251 - 1.00	NA
Neptunium-237	UNF	pCi/L	1/106	1/106	--	.626 - .626	.200 - 8.60	0.250
Plutonium-239/240	FIL	pCi/L	4/44	4/44	--	.506 - 1.00	.156 - 1.00	NA
Plutonium-239/240	UNF	pCi/L	2/116	2/116	--	1.00 - 1.00	.0940 - 1.00	ND
Plutonium-238	FIL	pCi/L	4/44	4/44	--	.913 - 1.00	0 - 1.00	NA
Plutonium-238	UNF	pCi/L	3/116	3/116	--	.744 - 1.00	.116 - 1.00	0.0750
Strontium-90	FIL	pCi/L	9/49	9/49	--	1.20 - 5.00	-.115 - 5.00	NA
Strontium-90	UNF	pCi/L	10/112	7/112	--	1.01 - 7.68	.600 - 5.00	2.00
Technetium-99	FIL	pCi/L	56/138	45/138	--	15.1 - 2670	-1.82 - 30.0	30.0
Technetium-99	UNF	pCi/L	64/170	55/170	--	15.8 - 6130	12.0 - 35.1	30.0
Ruthenium-106	FIL	pCi/L	0/41	0/41	--		110 - 153	NA
Ruthenium-106	UNF	pCi/L	0/109	0/109	--		119 - 165	ND
Aluminum	FIL	mg/L	73/196	42/196	--	.0144 - 10.4	.0114 - 20.0	0.123
Antimony	FIL	mg/L	24/192	19/192	--	.00550 - .0987	.000500 - 45.0	0.0272
Arsenic	FIL	mg/L	50/202	1/202	--	.00120 - .191	.00100 - .00500	0.122
Barium	FIL	mg/L	197/202	2/202	0.0715	.00750 - .589	.0138 - .400	0.454
Beryllium	FIL	mg/L	14/192	13/192	--	.00120 - .0343	.000300 - .0100	0.00180
Cadmium	FIL	mg/L	35/202	17/202	--	.00270 - .0500	.00100 - .0146	0.00600
Calcium	FIL	mg/L	203/204	95/204	129.0	4.65 - 1800	91.6 - 91.6	131
Chromium	FIL	mg/L	45/201	27/201	--	.00480 - .818	.00200 - .0200	0.0340
Cobalt	FIL	mg/L	23/192	23/192	--	.00630 - .0886	.00300 - .0257	ND
Copper	FIL	mg/L	40/202	22/202	--	.00340 - .298	.00200 - .0251	0.0190
Cyanide	UNF	mg/L	15/208	15/208	--	.00200 - .552	.0000200 -.0200	ND
Iron	FIL	mg/L	98/203	11/203	--	.0104 - 21.3	.00500 - .340	3.58
Lead	FIL	mg/L	36/203	5/203	--	.00100 - .0114	.00100 - .00690	0.00870

TABLE 4-45 (Continued)

Parameter	Filter Flag	Units	Frequency of Detection[b]	Frequency of Detection > Background	Median[c]	Range of Detection Results	Range of Non-Detect Results	95th Percentile of Background
Magnesium	FIL	mg/L	203/204	97/204	46.8	1.55 - 690	26.9 - 26.9	47.8
Manganese	FIL	mg/L	175/202	95/202	--	.00250 - 35.0	.00100 - .0200	0.180
Mercury	FIL	mg/L	4/202	4/202	--	.000200-.00180	.000100 -.00100	0.0004
Molybdenum	FIL	mg/L	36/146	25/146	--	.00450 - 1.42	.00300 - .0490	0.0170
Nickel	FIL	mg/L	41/202	33/202	--	.00370 - .981	.00300 - .0936	0.0220
Potassium	FIL	mg/L	177/203	5/203	--	.380 - 12400	.340 - 1.52	29.3
Selenium	FIL	mg/L	19/202	19/202	--	.00110 - .0494	.00100 - .0200	ND
Silicon	FIL	mg/L	90/91	31/91	7.05	3.37 - 15.0	6.96 - 6.96	7.43
Silver	FIL	mg/L	31/202	12/202	--	.00290 - .264	.000500 - .050	0.0400
Sodium	FIL	mg/L	203/203	35/203	24.0	2.35 - 1300		56.3
Thallium	FIL	mg/L	4/192	4/192	--	.00100 - .00280	.00100 - .0410	ND
Vanadium	FIL	mg/L	36/195	23/195	--	.00290 - .299	.00290 - .0500	0.0195
Zinc	FIL	mg/L	72/195	13/195	--	.00200 - 1.78	.00210 - .0360	0.0443
Ammonia	UNF	mg/L	100/181	4/181	0.076	.0300 - 220	.0200 - .400	4.34
Chloride	UNF	mg/L	169/173	54/173	18	.0320 - 6300	2.20 - 13.0	45.0
Fluoride	UNF	mg/L	170/170	10/170	0.44	.125 - 6.80		1.30
Nitrate	UNF	mg/L	153/253	105/253	0.15	.0120 - 2670	.0200 - .200	0.290
Sulfate	UNF	mg/L	168/171	56/171	94.81	.170 - 6200	.500 - 2.00	136

[a]Based on Table E.1-1 in Appendix E
[b]Frequency of detection is defined as (number of detectable results)/(number of wells tested)
[c]Medians were calculated only if a data set had more than one detectable result, and greater than or equal to 50 percent frequency of detection
NA Not Analyzed
ND Not Detected